

# Dissolved Oxygen and Apparent Oxygen Utilization inventory variability in the North Pacific (1970 to 1998)

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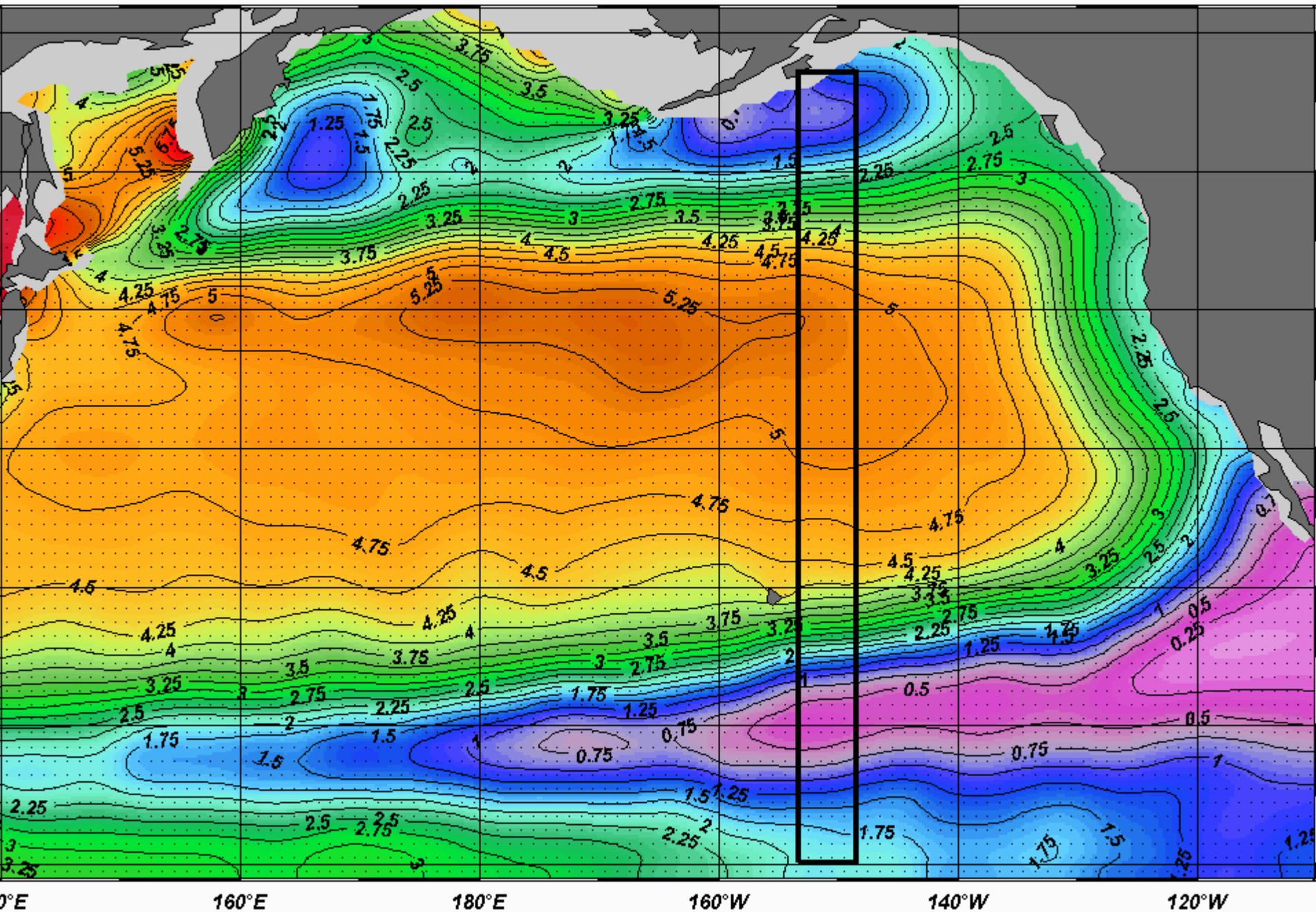
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<http://www.nodc.noaa.gov/OCL/>

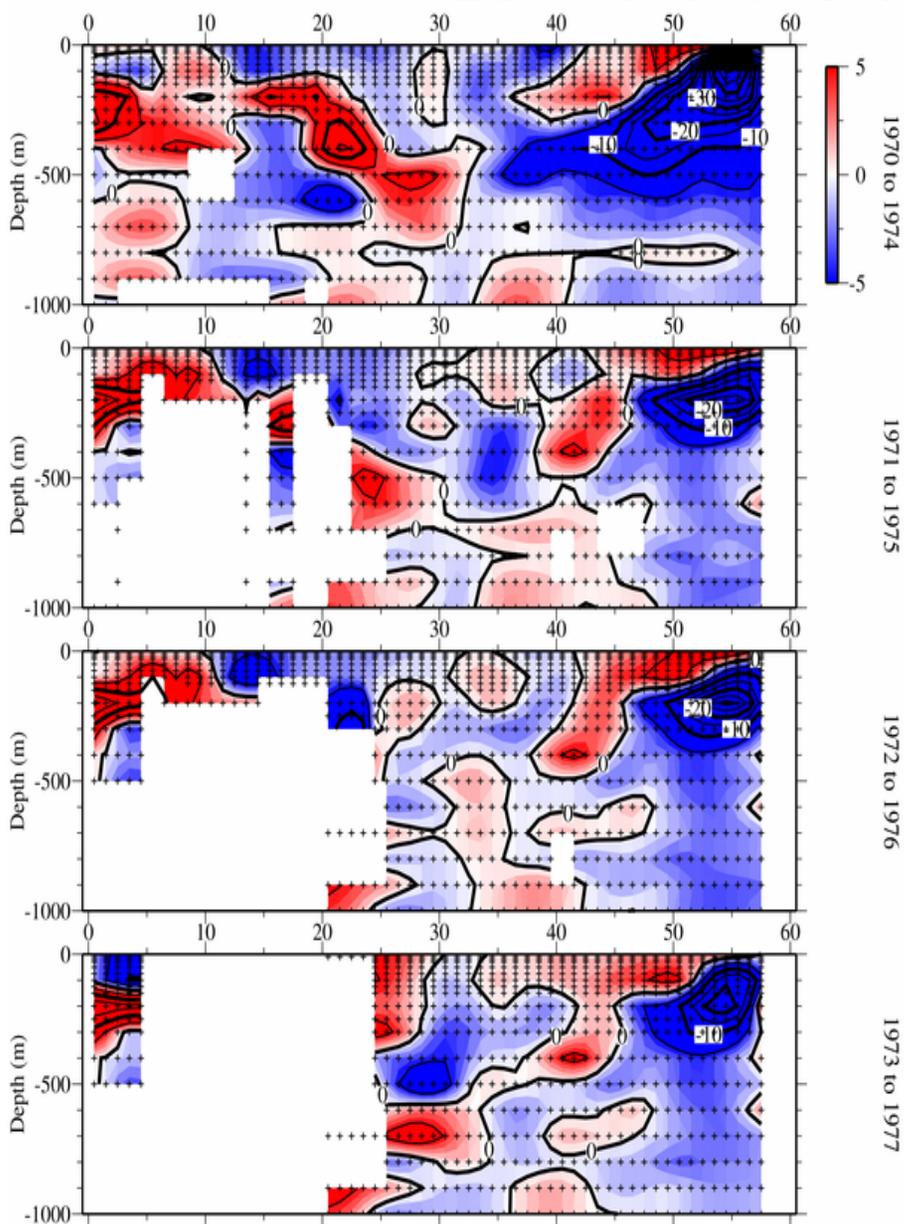


# Oxygen [ml/l] on Depth [m]=250

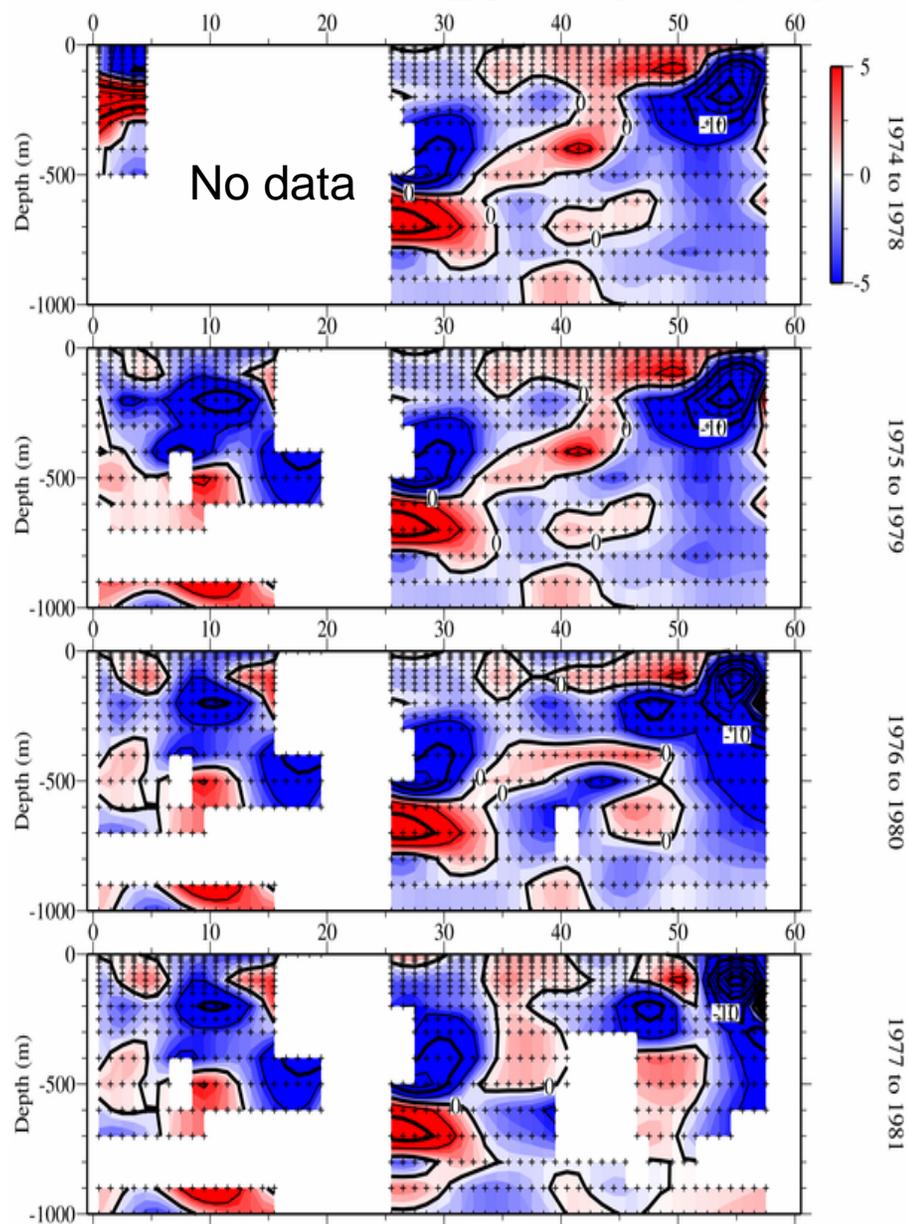


# Meridional Sections along nominally 150°W

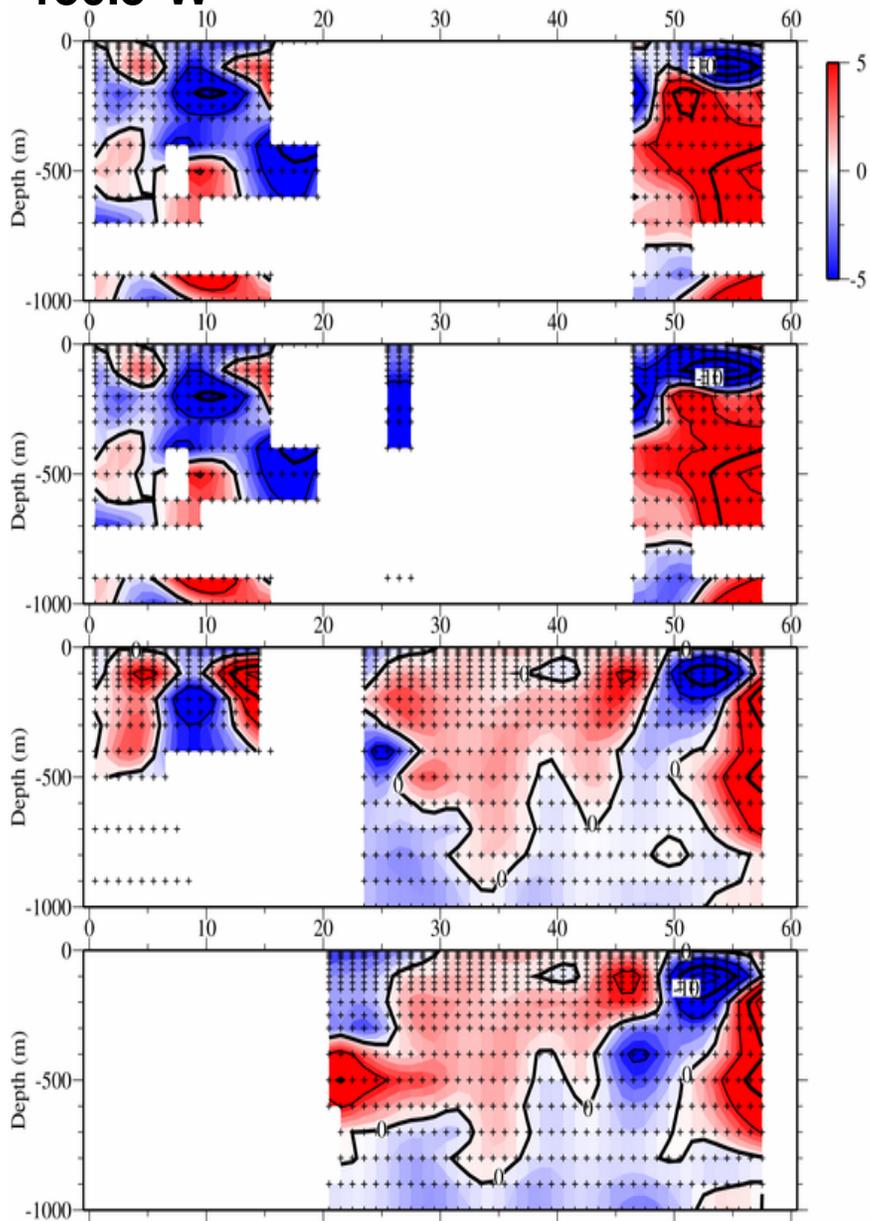
150.5°W Oxygen anomaly (umol/kg)  $\Delta O_2$ : 1970 to 1973



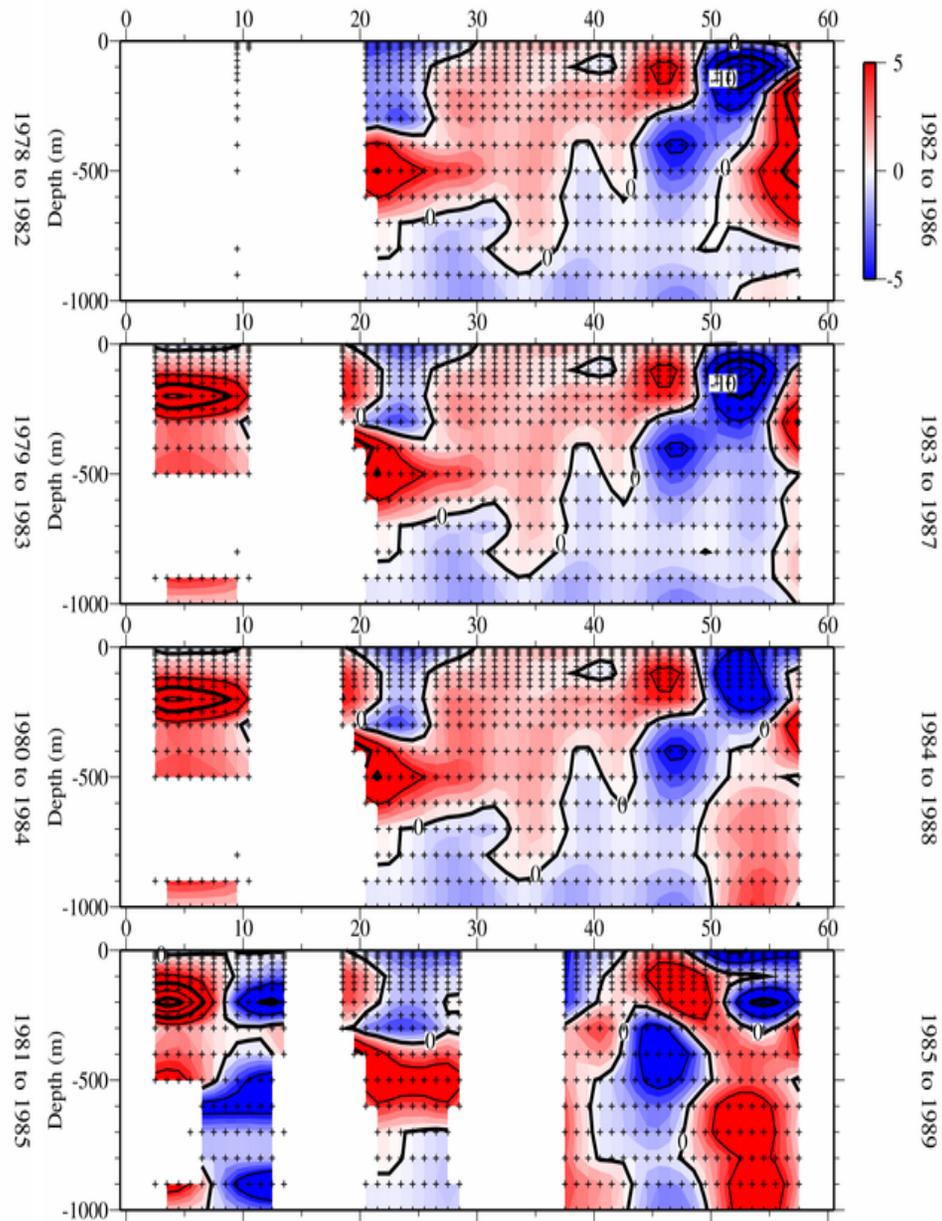
155.5°W Oxygen anomaly (umol/kg)  $\Delta O_2$ : 1974 to 1977



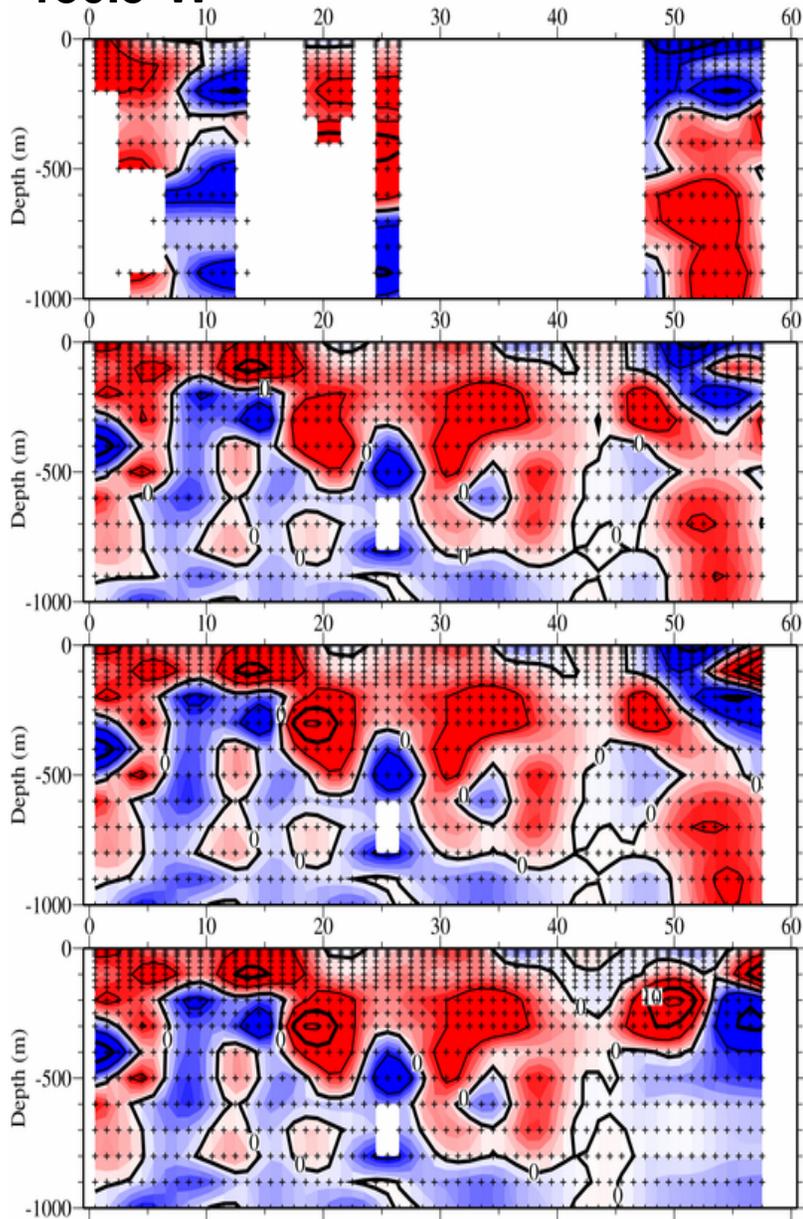
155.5°W Oxygen anomaly (umol/kg)  $\Delta O_2$ : 1978 to 1981



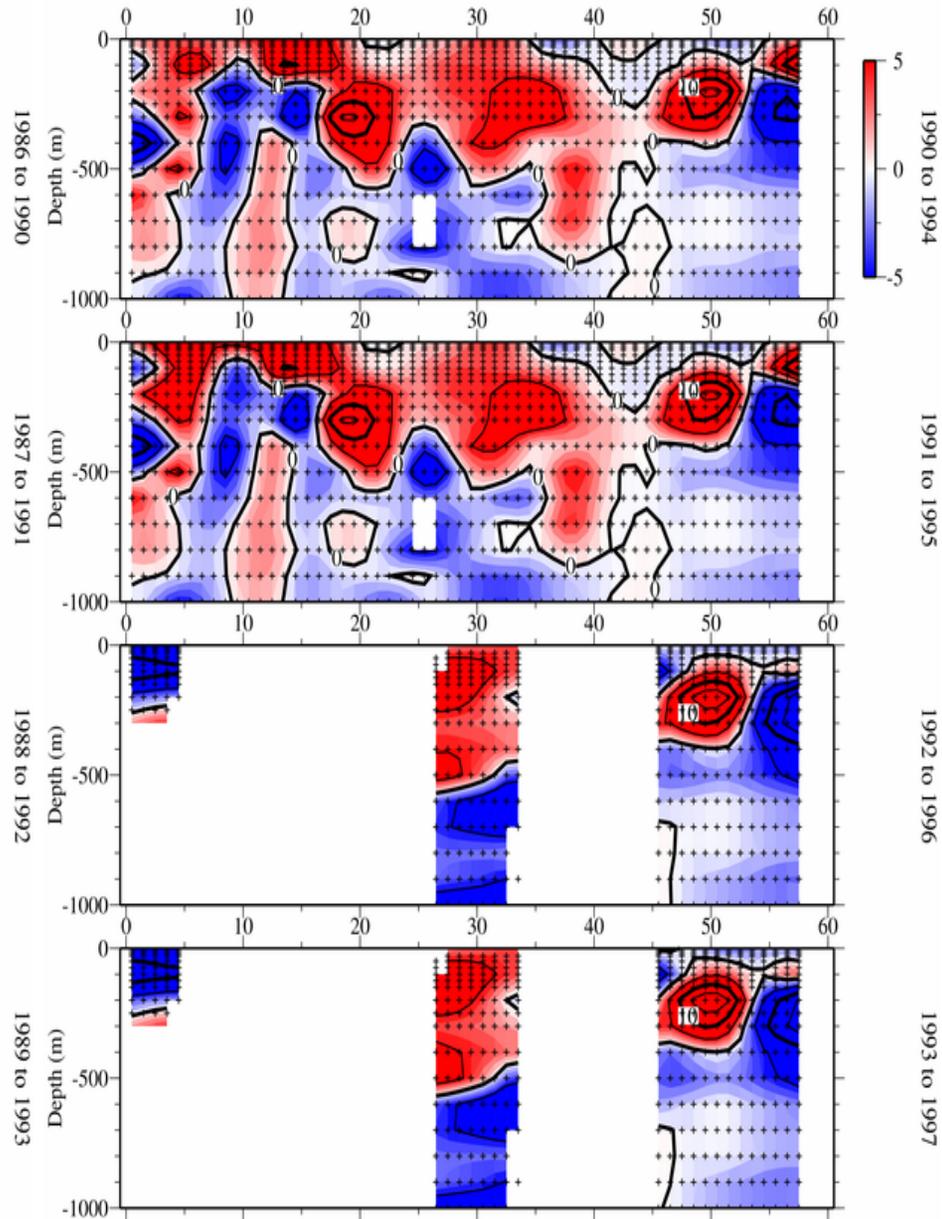
155.5°W Oxygen anomaly (umol/kg)  $\Delta O_2$ : 1982 to 1985



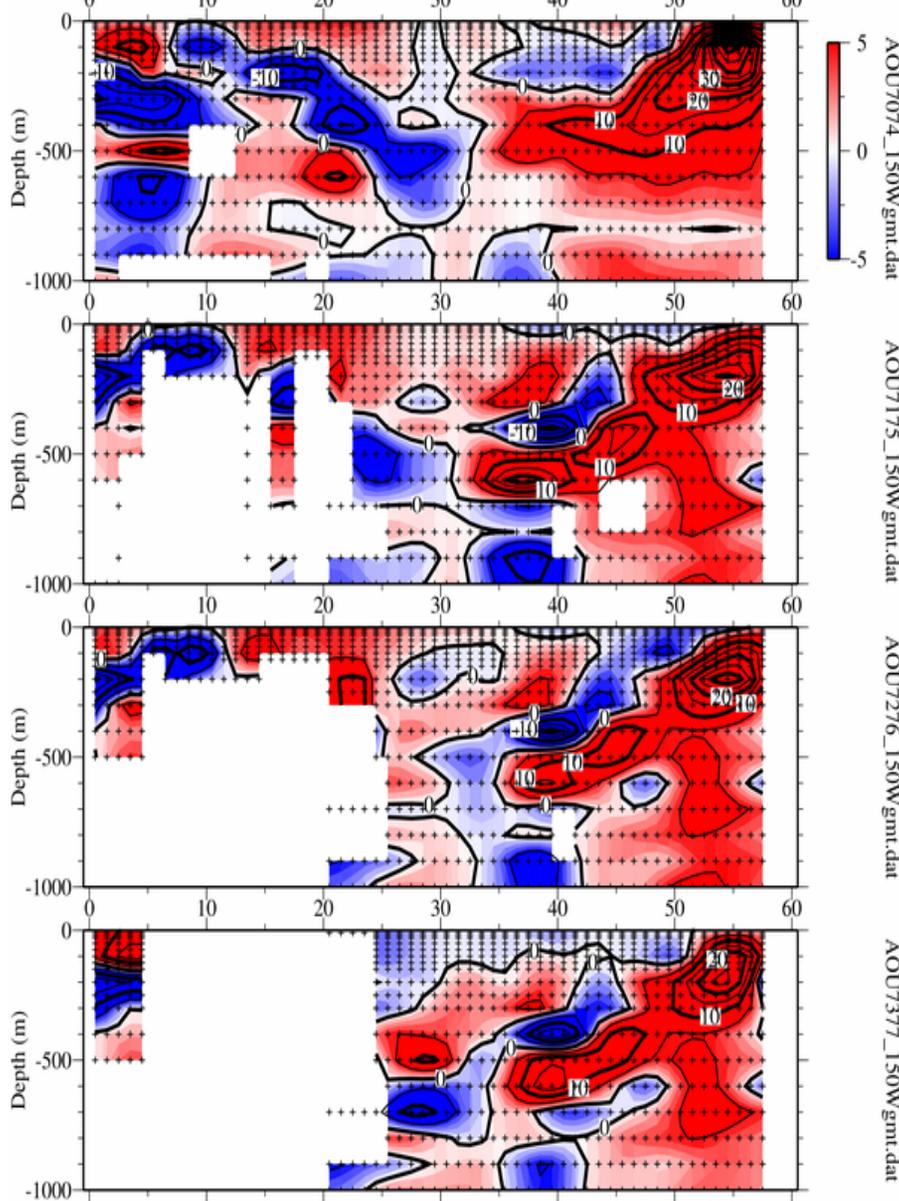
155.5°W Oxygen anomaly (umol/kg)  $\Delta O_2$ : 1986 to 1989



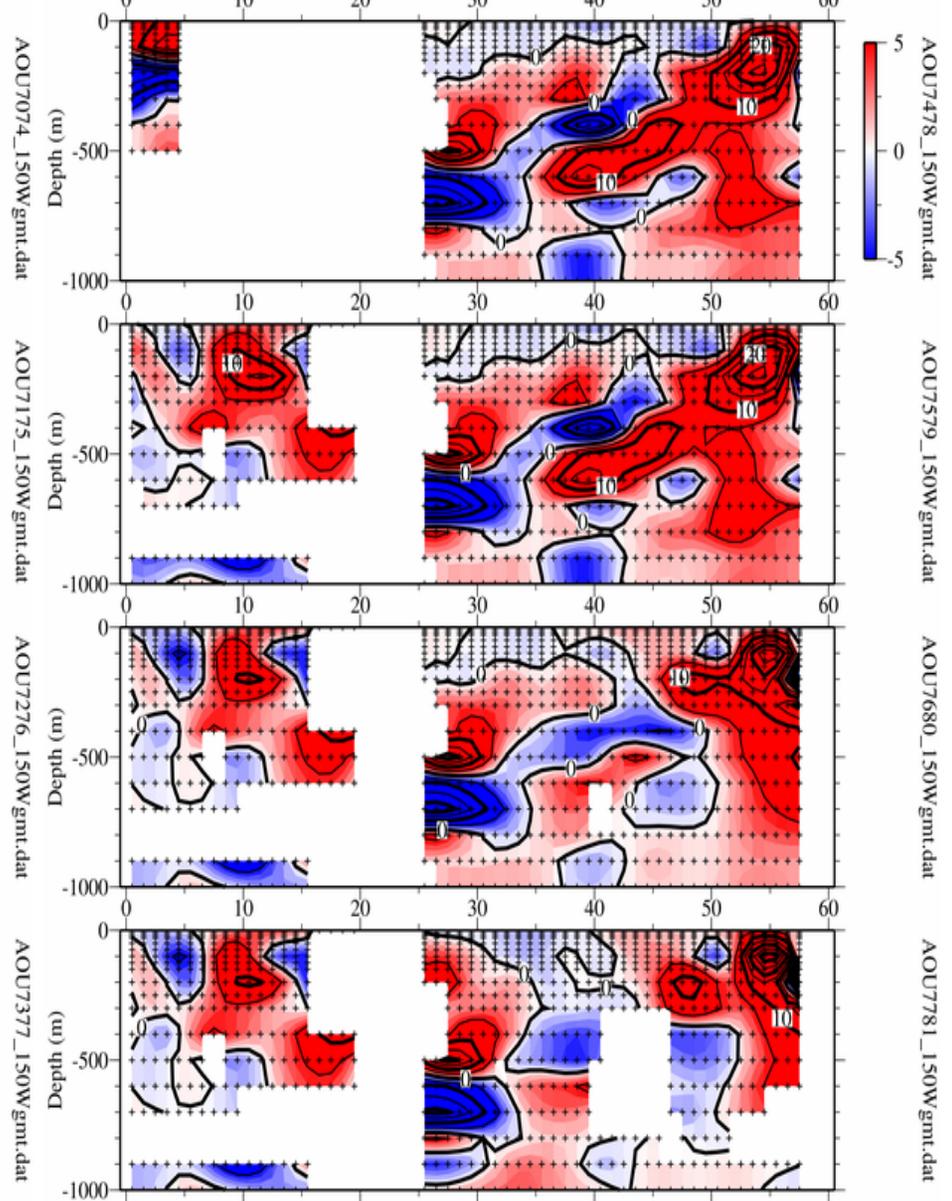
155.5°W Oxygen anomaly (umol/kg)  $\Delta O_2$ : 1990 to 1993



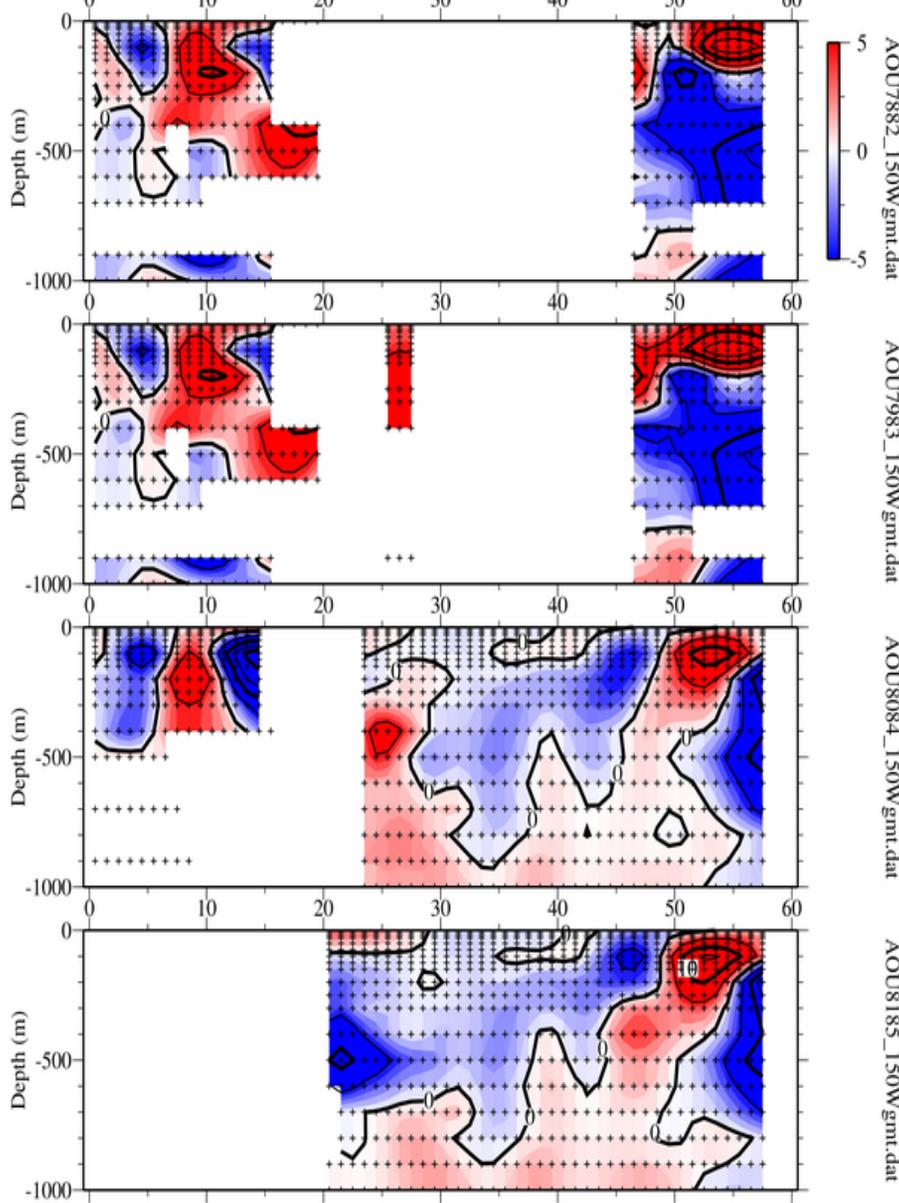
155.5°W AOU anomaly (umol/kg)  $\Delta$ AOU: 1970 to 1973



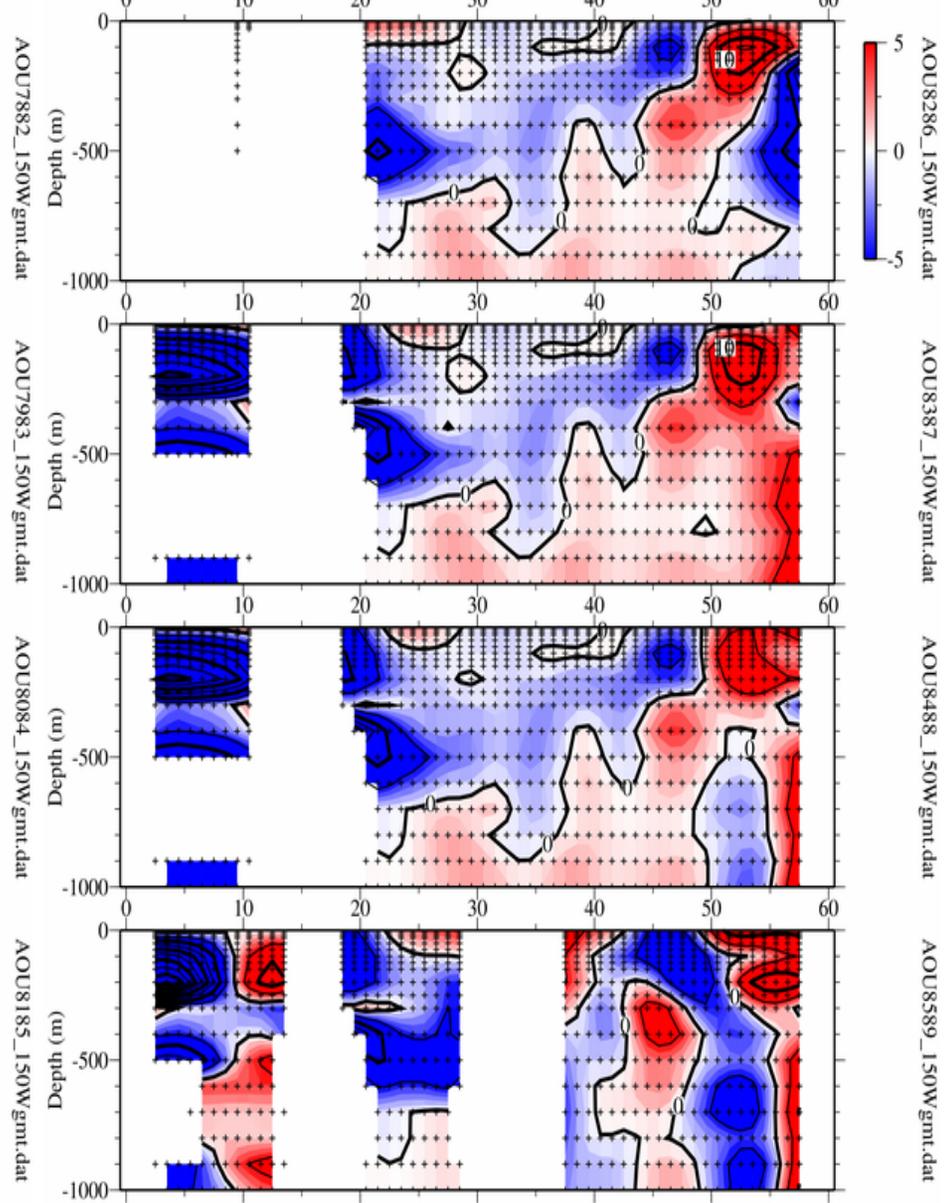
155.5°W AOU anomaly (umol/kg)  $\Delta$ AOU: 1974 to 1977



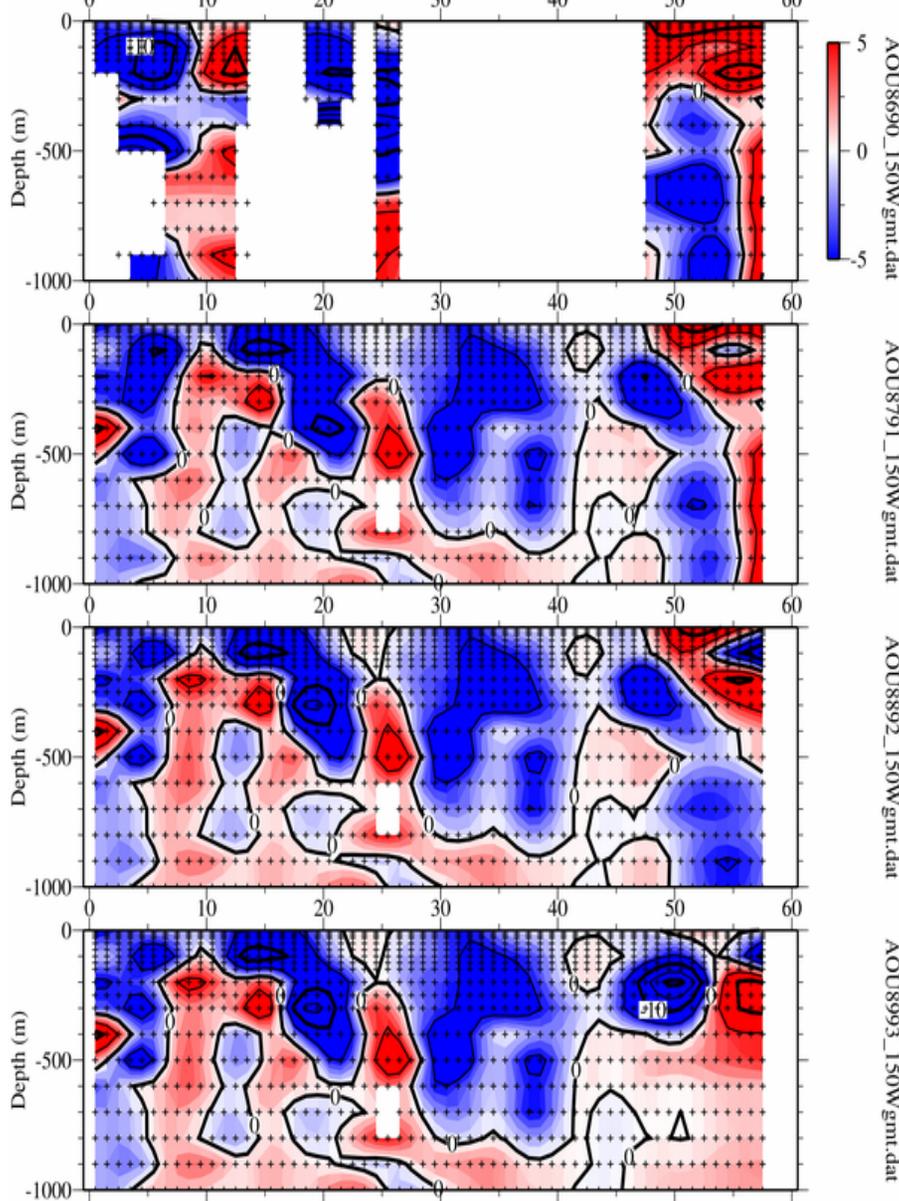
# 150.5°W $\Delta$ AOU: 1970 to 1973



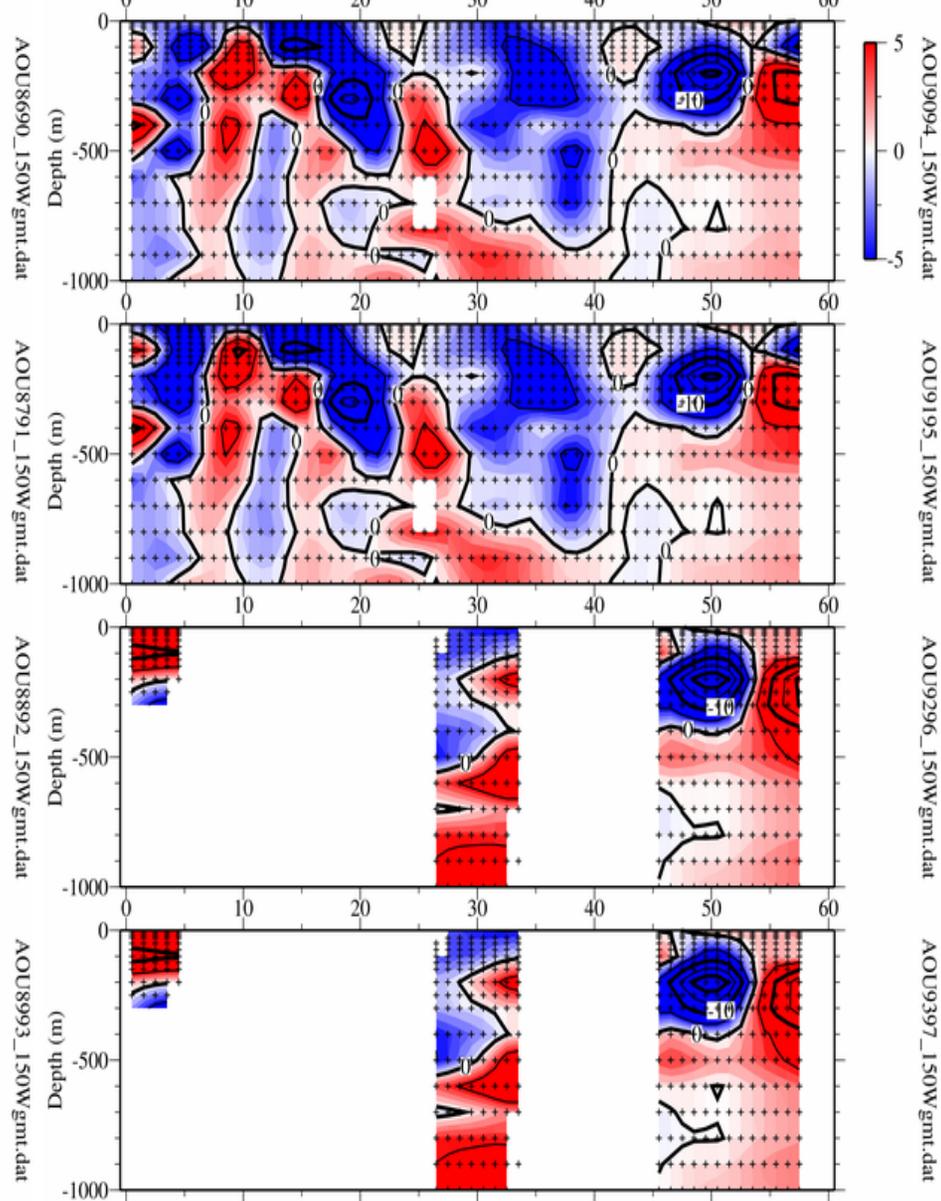
# 155.5°W AOU anomaly ( $\mu\text{mol/kg}$ ) $\Delta$ AOU: 1974 to 1977



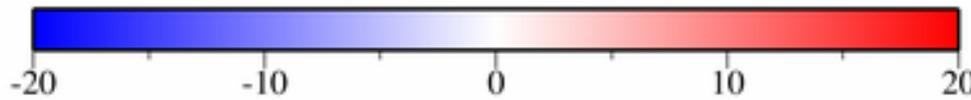
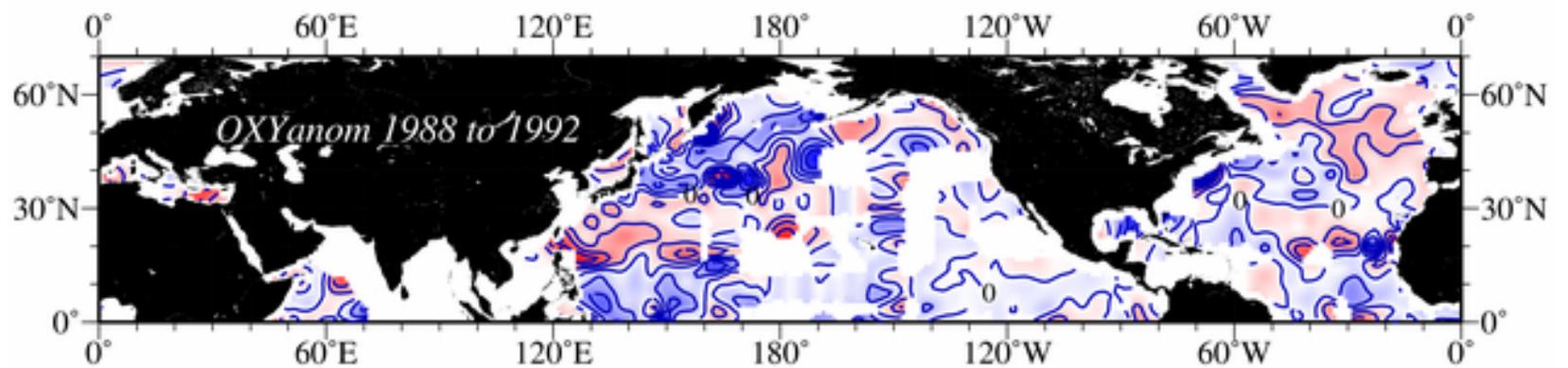
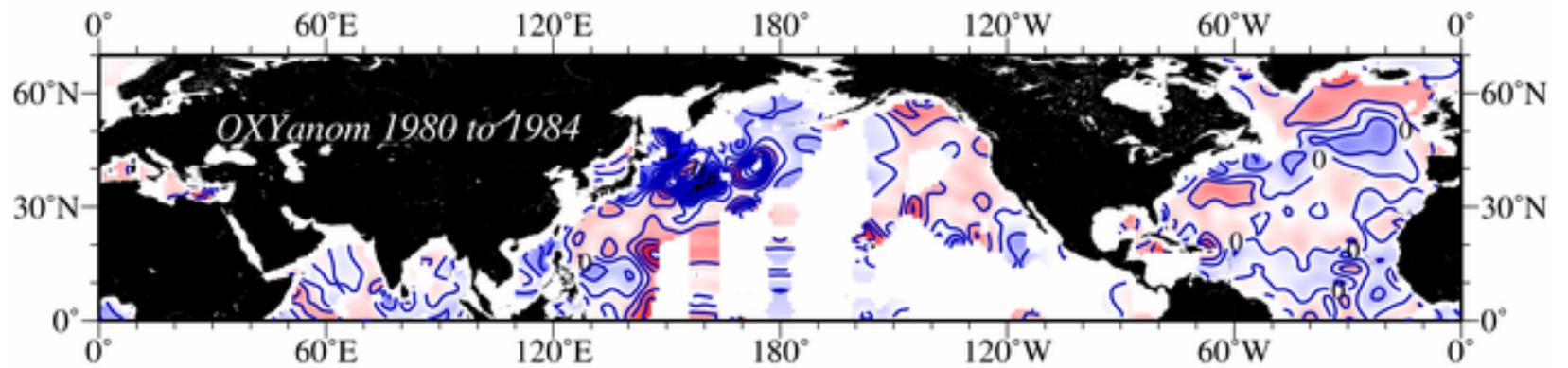
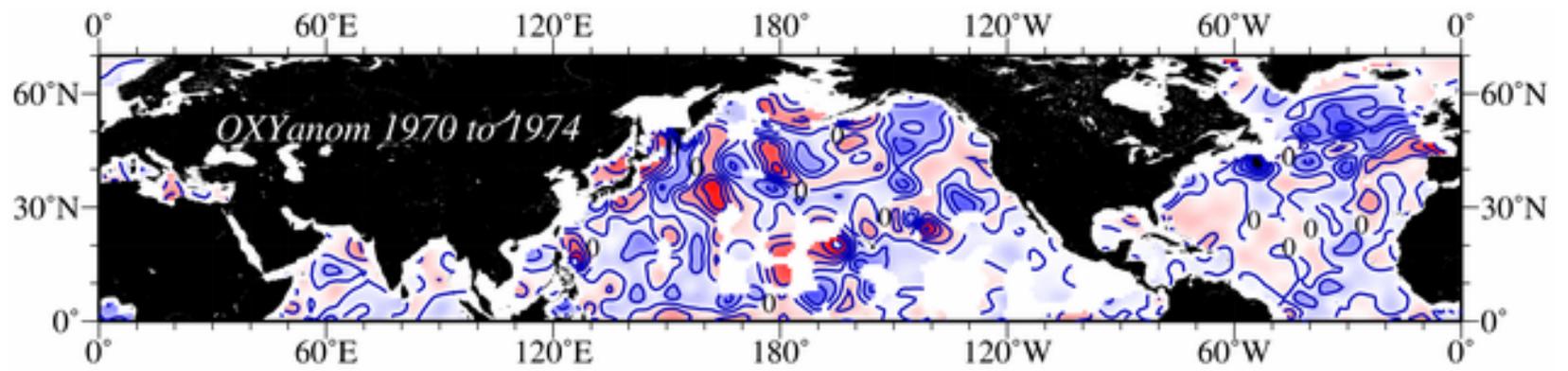
150.5°W AOU anomaly (umol/kg)  $\Delta$ AOU: 1970 to 1973



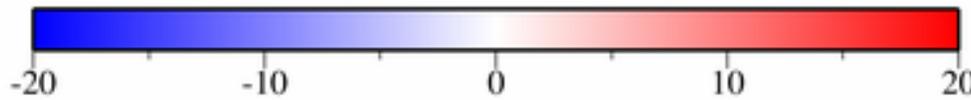
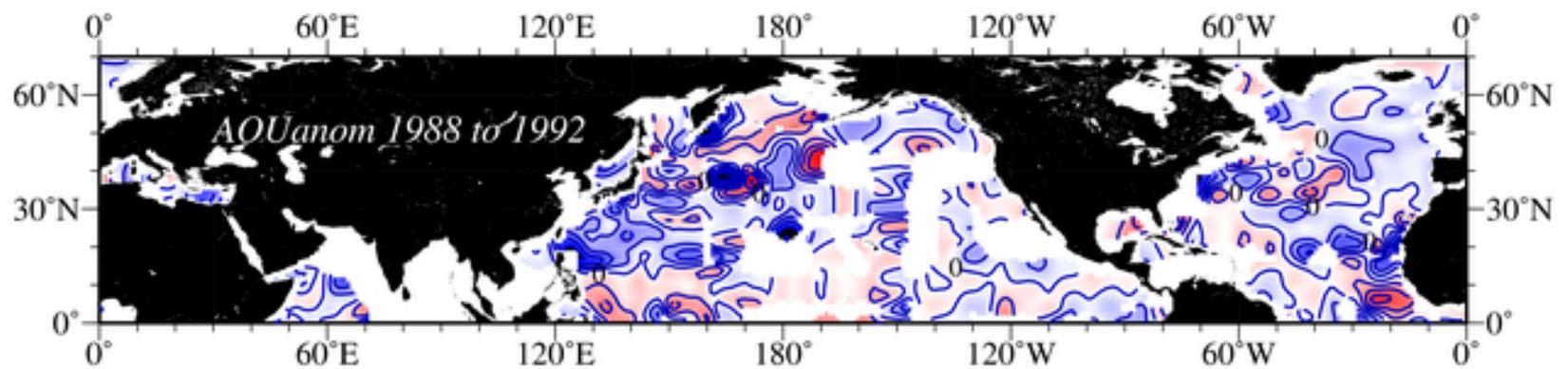
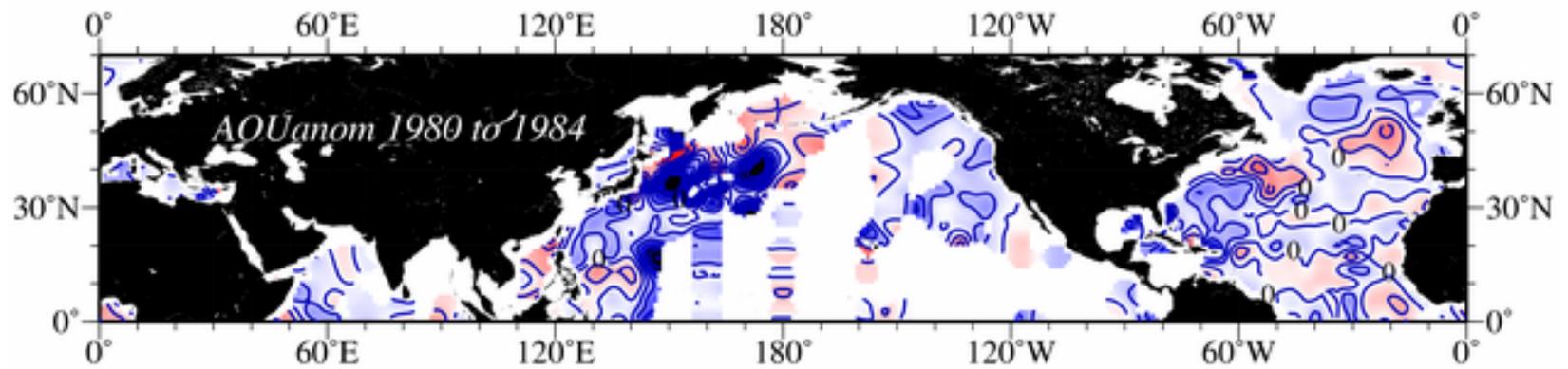
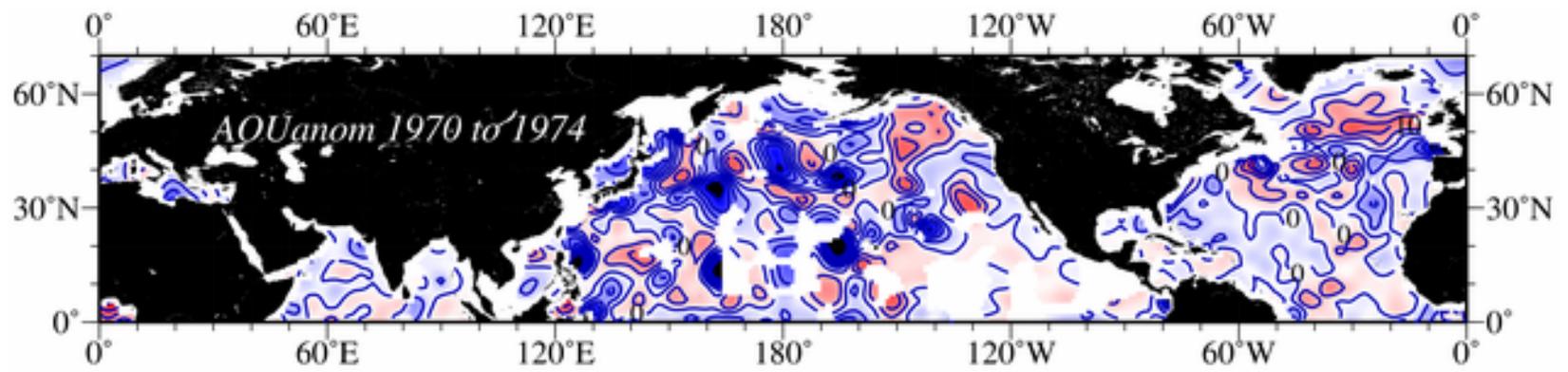
155.5°W AOU anomaly (umol/kg)  $\Delta$ AOU: 1974 to 1977



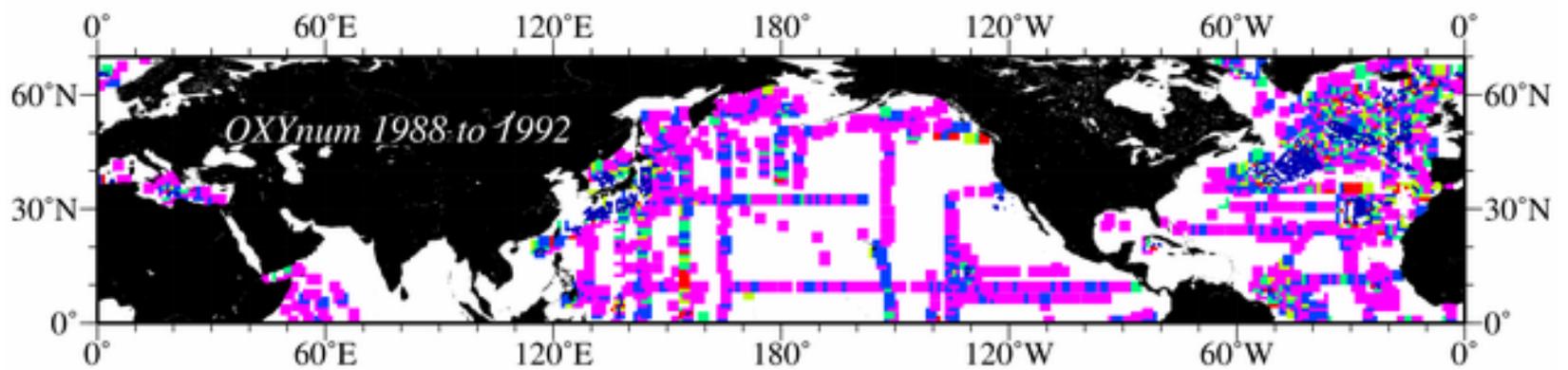
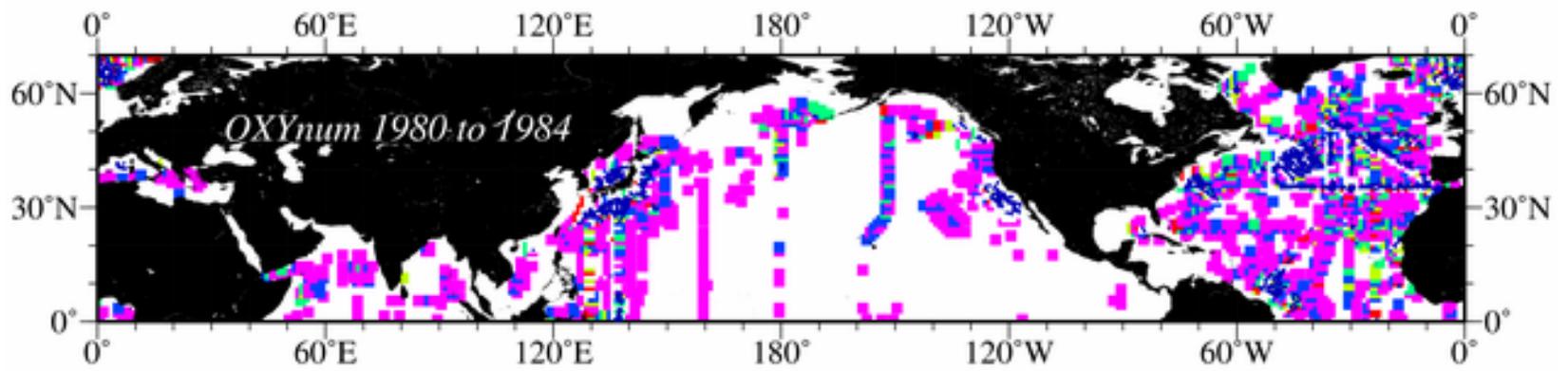
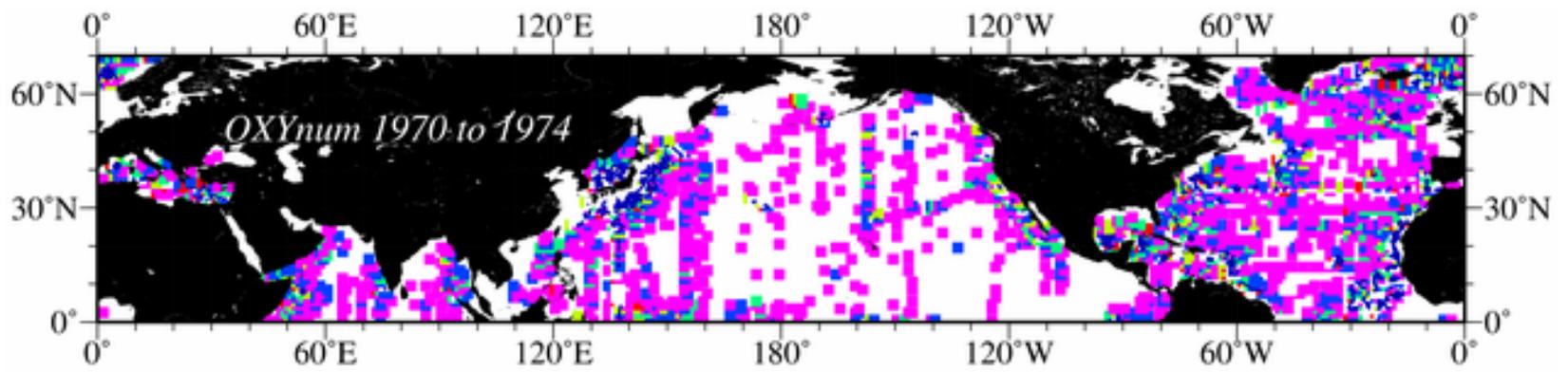
# Sample maps of O<sub>2</sub> and AOU anomalies (μmol/kg)



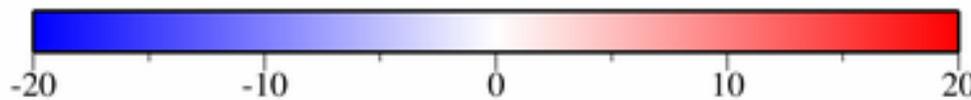
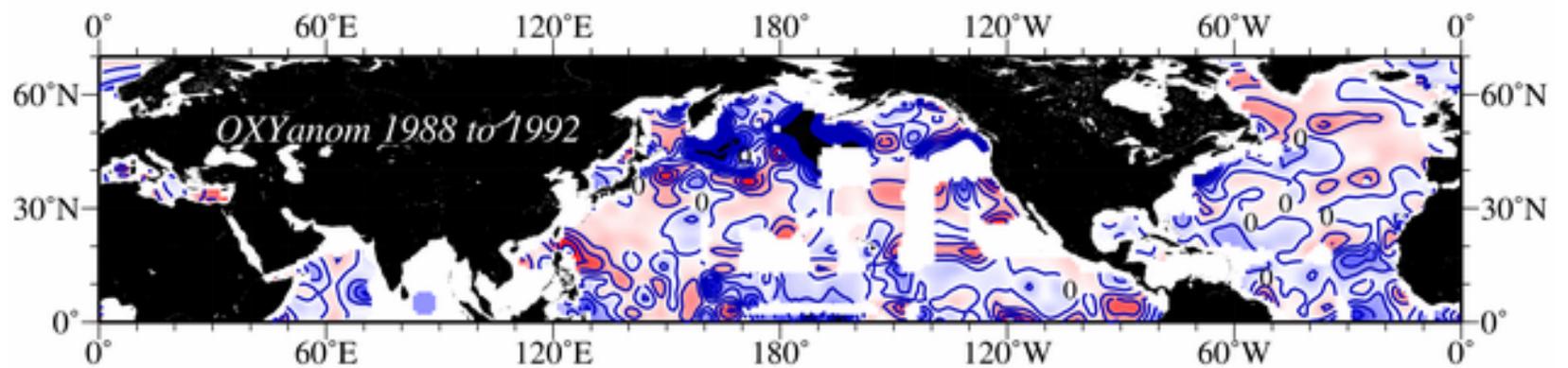
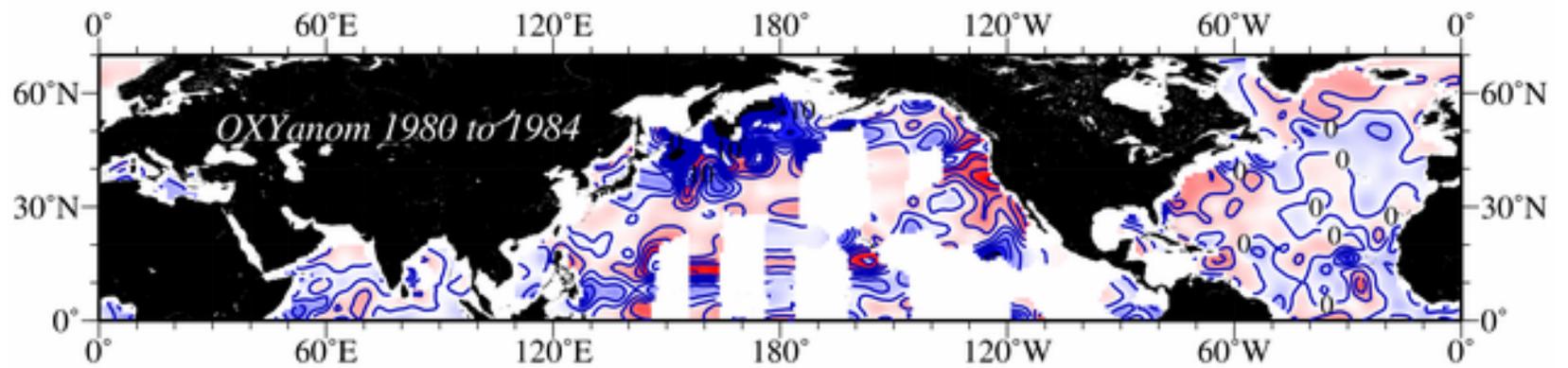
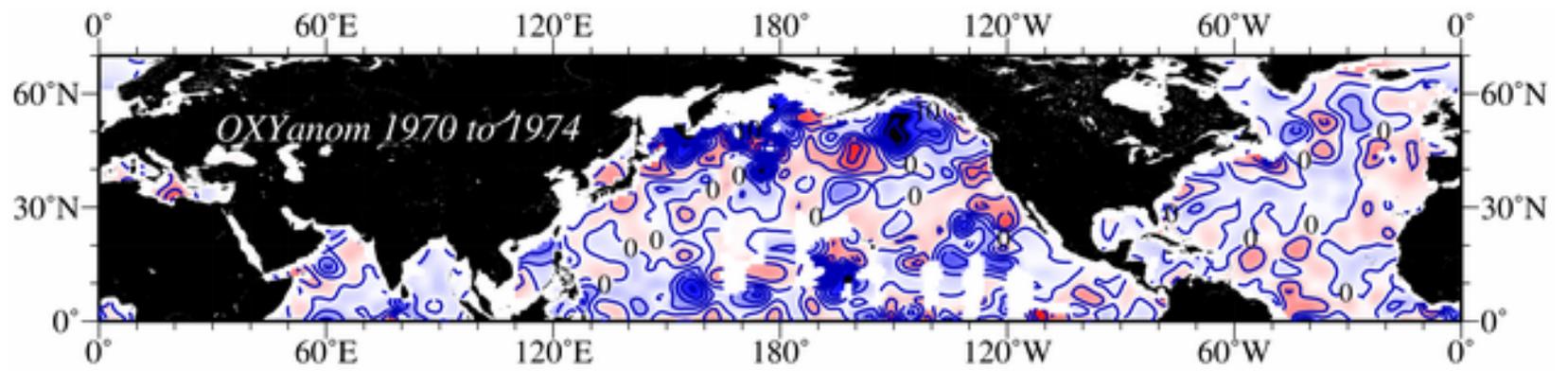
500 m depth



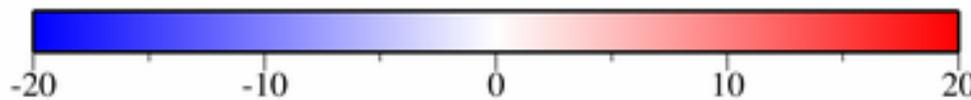
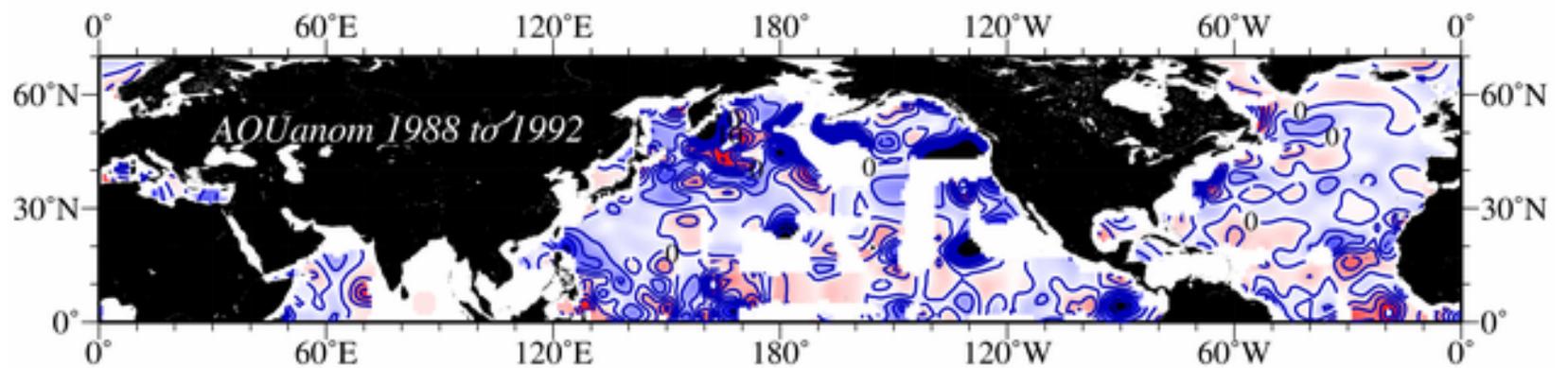
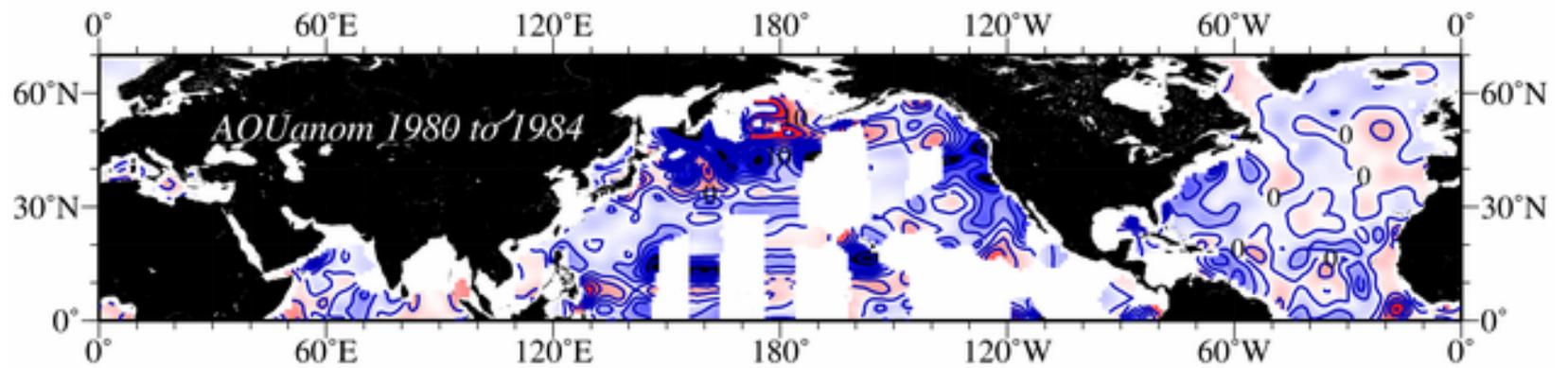
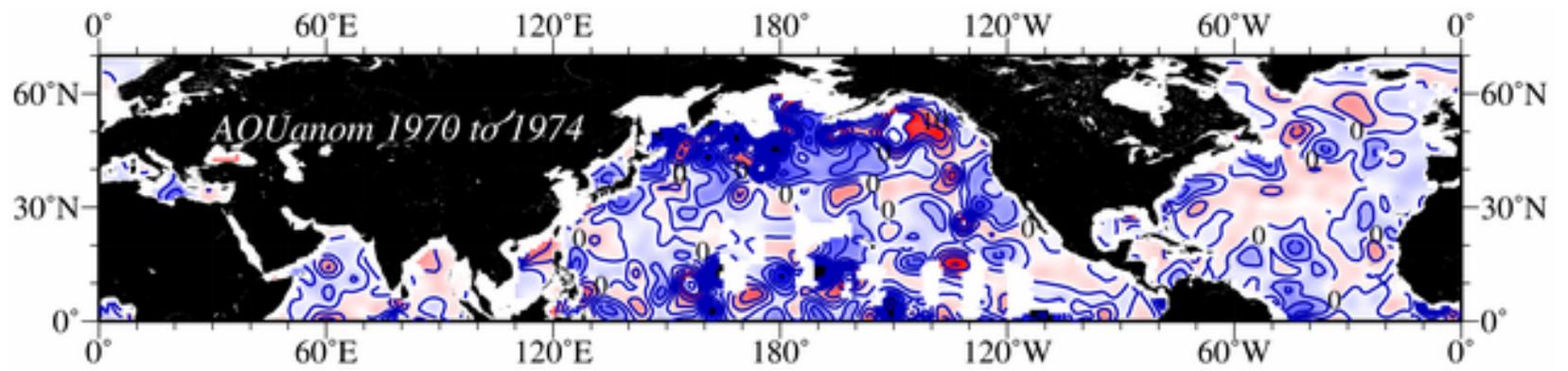
500 m depth



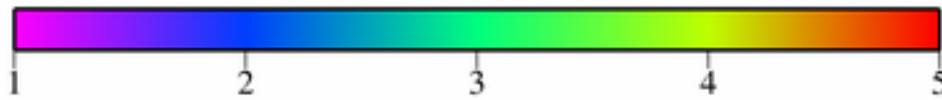
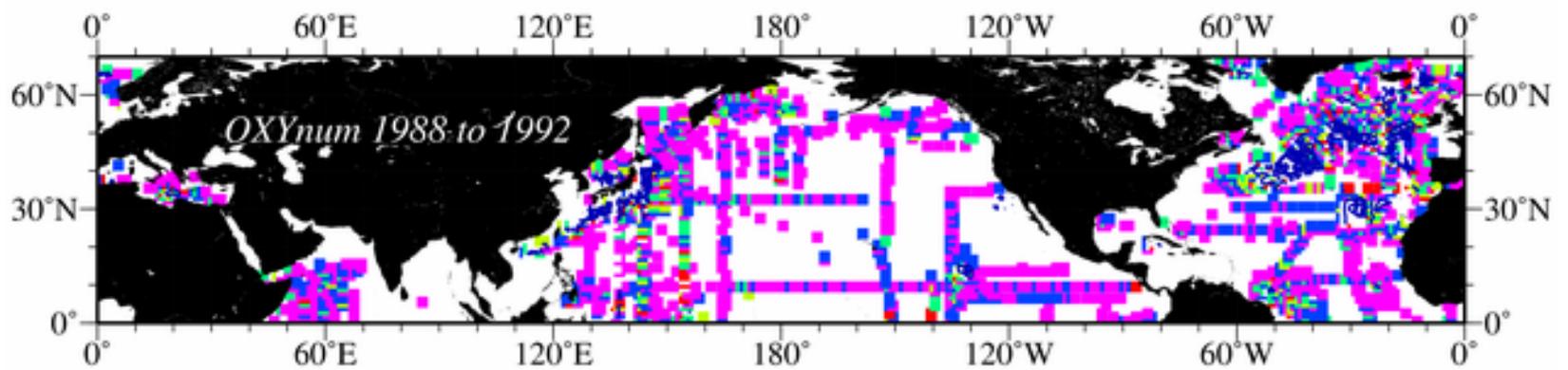
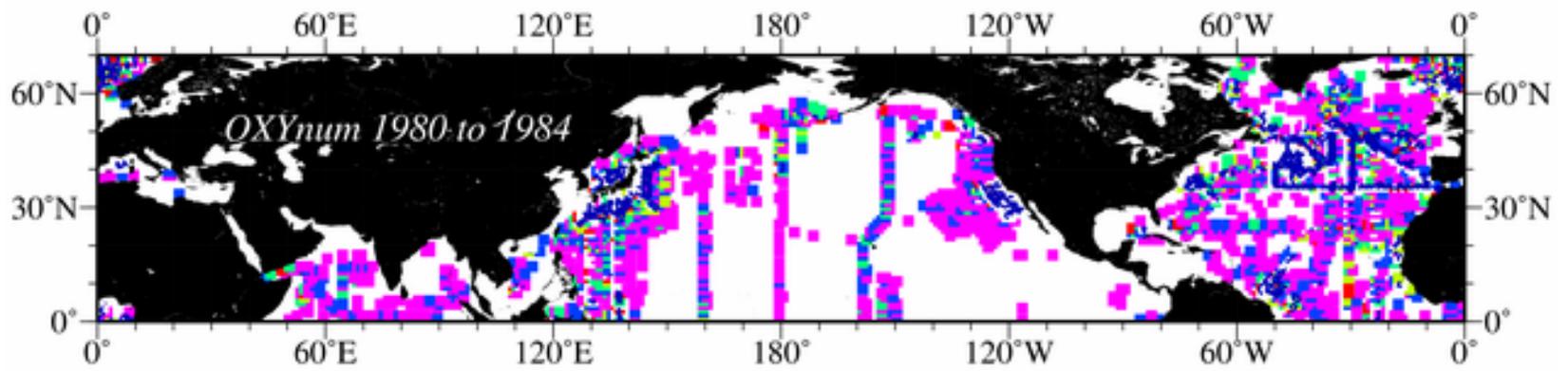
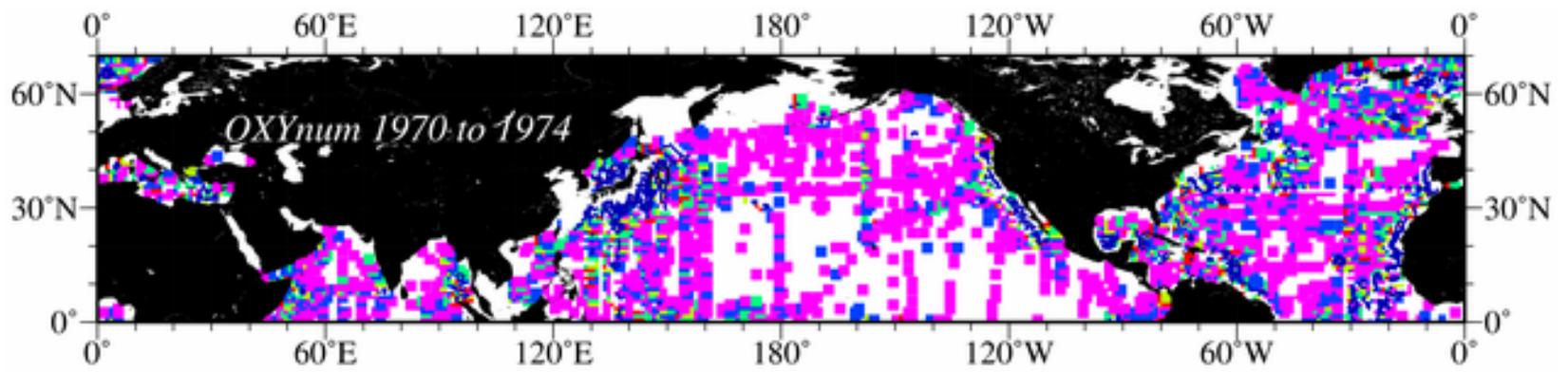
500 m depth



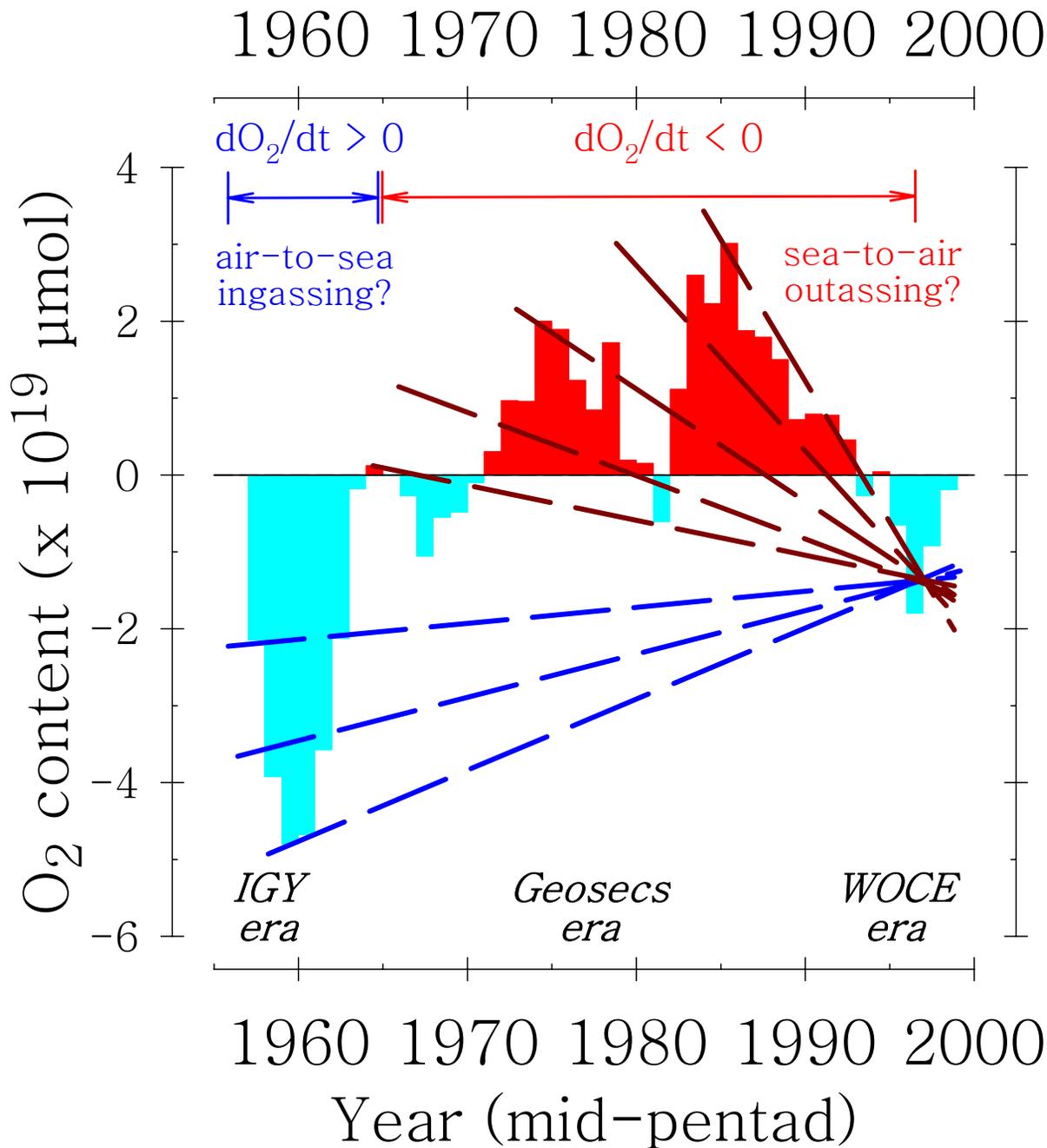
250 m depth



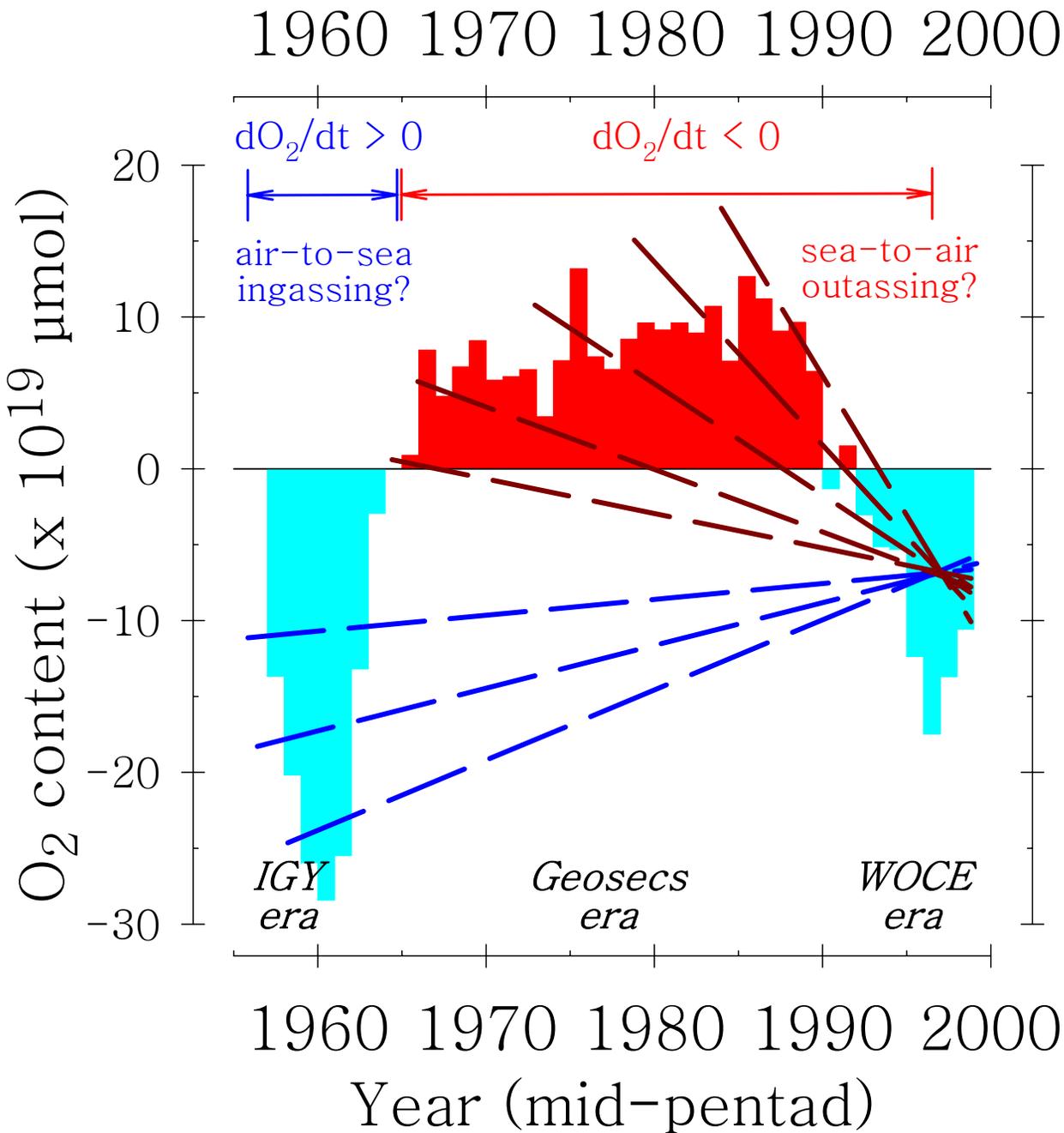
250 m depth



250 m depth

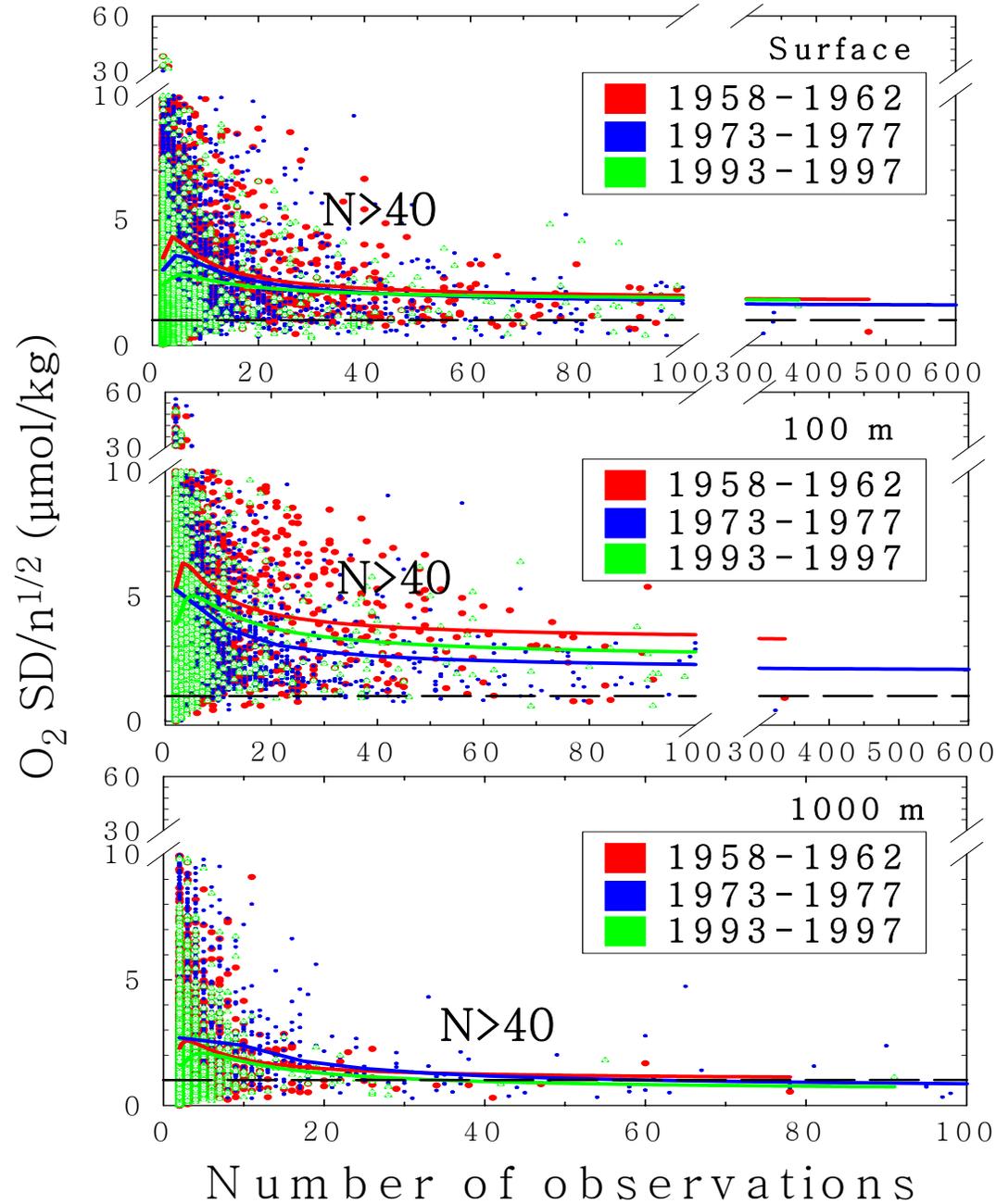


Surface  
World Ocean  
 $O_2$  content  
anomalies  
(1955–1998)  
( $\leq 100$  m,  
70°S–70°N)



World Ocean  
 $O_2$  content  
 anomalies  
 (1955–1998)  
 (Layer:  
 100–1500 m  
 70°S–70°N)

# O<sub>2</sub> sampling errors for different pentads & depths



O<sub>2</sub> long-term precision (deep N. Pacific & N. Atlantic [1972-1996]):  
 $\pm 1.0\text{-}2.2 \mu\text{mol}/\text{kg}$

[e.g. Saunders, 1986; Gouretski and Jancke, 1996; WOCE, 1994; Garcia and Keeling, 2001; Garcia et al. 1998; Johnson et al 2000]

Std Error for N > 50; all basins  
[1955-1962]:  $\pm 2\text{-}4 \mu\text{mol}/\text{kg}$   
[1978-1977]:  $\pm 1\text{-}3 \mu\text{mol}/\text{kg}$   
[1993-1997]:  $\pm 1\text{-}2 \mu\text{mol}/\text{kg}$   
No systematic or proportional errors assumed

# Summary/Questions

- What mode of variability are we after?  
Remove seasonal bias?
- Coastal vs open ocean? Regime shift issue? Equatorial vs extra-tropical domain? ENSO...
- A working time frame for reference?  
WOCE era?